^{9}Be(^{33}Mg,xγ) 2022Ki08

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Jun Chen	NDS 201,1 (2025)	31-Oct-2024

2022Ki08 (also 2021Ki09): E=99.6 MeV/nucleon ^{33}Mg secondary beam was produced via fragmentation of a 140 MeV/nucleon ^{48}Ca primary beam from the Coupled Cyclotron Facility at NSCL on a 846 mg/cm^2 ^{9}Be production target. Fragments were separated with the A1900 fragment separator. The secondary target was 375 mg/cm^2 ^{9}Be. Outgoing particles were momentum-analyzed with the S800 magnetic spectrograph and detected with the focal-plane detectors; γ rays were detected with the GRETINA array consisting of 7 modules, with each module housing 4 crystals and each crystal having 36 segments. Measured Eγ, Iγ, $\gamma\gamma$-coin, γ-ray yields, momentum distributions. Deduced levels, J, π, spectroscopic factors. Comparisons with shell-model calculations.

^{32}Mg Levels

Inclusive σ_{exp}=104 mb *5*, unplaced σ_{exp}=2.1 mb *5* (2022Ki08).

E(level)[†]	J$^\pi$[#]	C^{2}S[‡]	Comments
0.0	0$^+$	0.33 *7*	σ_{exp}=13.0 mb *29*. C^{2}S: for 2p$_{3/2}$.
885.0 *10*	2$^+$	0.59 *7*	σ_{exp}=27.7 mb *21*. C^{2}S: for 2p$_{3/2}$ 69%, 0.44 *5* for 1f$_{7/2}$ 31%.
2288.1 *22*	(0,2)$^+$		
2322.1 *22*	4$^+$	0.75 *6*	σ_{exp}=12.9 mb *12*. C^{2}S: for 1f$_{7/2}$.
2550.9 *23*	(1$^-$,2$^+$)	0.18 *4*	σ_{exp}=11.4 mb *9*. C^{2}S: 0.18 *4* for 2s$_{1/2}$ 45%, 0.35 *8* for 1d $_{3/2}$ 55%; 0.44 *5* for 2p$_{3/2}$, 0.05 *5* for 1f$_{7/2}$ 8%.
2846.1 *32*	(0,2)$^+$		
2858.7 *27*	(2,3)$^-$		σ_{exp}=6.4 mb *6*. C^{2}S: 0.23 *2* for 2s$_{1/2}$, or 0.37 *3* for 1d$_{3/2}$.
3037.1 *32*	(2)$^-$	0.30 *4*	σ_{exp}=13.7 mb *9*. C^{2}S: for 2s$_{1/2}$ 59%, 0.33 *6* for 1d$_{3/2}$ 41%.
3123.1 *32*			σ_{exp}=3.5 mb *6*.
3480 *4*	(2)$^+$		σ_{exp}=2.7 mb *4*.
3555.1 *30*		0.12 *2*	σ_{exp}=2.0 mb *3*. C^{2}S: for 1d$_{3/2}$.
3678 *4*	(2,4)$^+$		σ_{exp}=1.6 mb *4*.
3946 *4*			σ_{exp}=1.1 mb *3*.
4095 *4*	6$^+$		σ_{exp}=2.4 mb *4*.
4152.4 *28*	4$^+$		σ_{exp}=1.8 mb *4*.
4707 *5*	4$^+$		σ_{exp}=0.8 mb *4*.
4819 *8*		0.04 *1*	σ_{exp}=0.9 mb *3*. C^{2}S: 0.04 *1* for 2s$_{1/2}$ or 0.06 *2* for 1d$_{3/2}$.
4919 *4*	(0,2,4)$^+$		J$^\pi$: (2,4)$^+$ in Adopted Levels. σ_{exp}=0.7 mb *4*.
5230 *5*	4$^+$		σ_{exp}=1.6 mb *4*.

[†] From a least-squares fit to γ-ray energies.

[‡] C^{2}S=σ_{exp}/σ_{sp} (2022Ki08), where σ_{sp} is theoretical single-particle cross section.

[#] Proposed in 2022Ki08 based on measured momentum distributions and shell-model predictions, unless otherwise noted. When considered in Adopted Levels, assignments will be placed inside parentheses if there are no strong supporting arguments from other studies.

^{9}Be(^{33}Mg,xγ) 2022Ki08 (continued)

$\gamma(^{32}Mg)$

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Comments
[x]524 *1*						
885	100 *3*	885.0	2^+	0.0	0^+	E_γ: rounded value from Adopted Gammas.
1233 *2*	2.4 *4*	3555.1		2322.1	4^+	
1293[‡] *3*		4152.4	4^+	2858.7	$(2,3)^-$	
1403 *2*		2288.1	$(0,2)^+$	885.0	2^+	
1437 *2*	25.0 *10*	2322.1	4^+	885.0	2^+	
1602[‡] *4*		4152.4	4^+	2550.9	$(1^-,2^+)$	
1624 *3*	1.3 *4*	3946		2322.1	4^+	
1666 *3*	3.8 *4*	2550.9	$(1^-,2^+)$	885.0	2^+	
1773 *3*	2.9 *5*	4095	6^+	2322.1	4^+	
1796 *3*	0.8 *5*	4919	$(0,2,4)^+$	3123.1		
[x]1917 *4*						
1961 *3*		2846.1	$(0,2)^+$	885.0	2^+	
1973 *3*	7.7 *6*	2858.7	$(2,3)^-$	885.0	2^+	
2152 *3*	16.5 *8*	3037.1	$(2)^-$	885.0	2^+	
2238 *3*	5.0 *5*	3123.1		885.0	2^+	
[x]2296 *6*	0.7 *4*					
2385 *4*	0.9 *4*	4707	4^+	2322.1	4^+	
2551 *4*	10.0 *7*	2550.9	$(1^-,2^+)$	0.0	0^+	
2595 *4*	3.3 *5*	3480	$(2)^+$	885.0	2^+	
2793 *4*	1.9 *4*	3678	$(2,4)^+$	885.0	2^+	
2908 *4*	1.9 *4*	5230	4^+	2322.1	4^+	
3268 *5*	2.2 *4*	4152.4	4^+	885.0	2^+	
[x]3415 *7*	1.9 *4*					
3934 *8*	1.1 *4*	4819		885.0	2^+	
[x]3961 *7*						
[x]4304 *20*						
[x]4364 *13*						

[†] From 2022Ki08, unless otherwise noted. Intensities are relative to Iγ(885γ)=100. A 3% systematic uncertainty from efficiency calibration as stated in 2022Ki08 has been added in quadrature by the evaluator for intensities from 2022Ki08.

[‡] Placement of transition in the level scheme is uncertain.

[x] γ ray not placed in level scheme.

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Level Scheme

Intensities: Relative I_γ

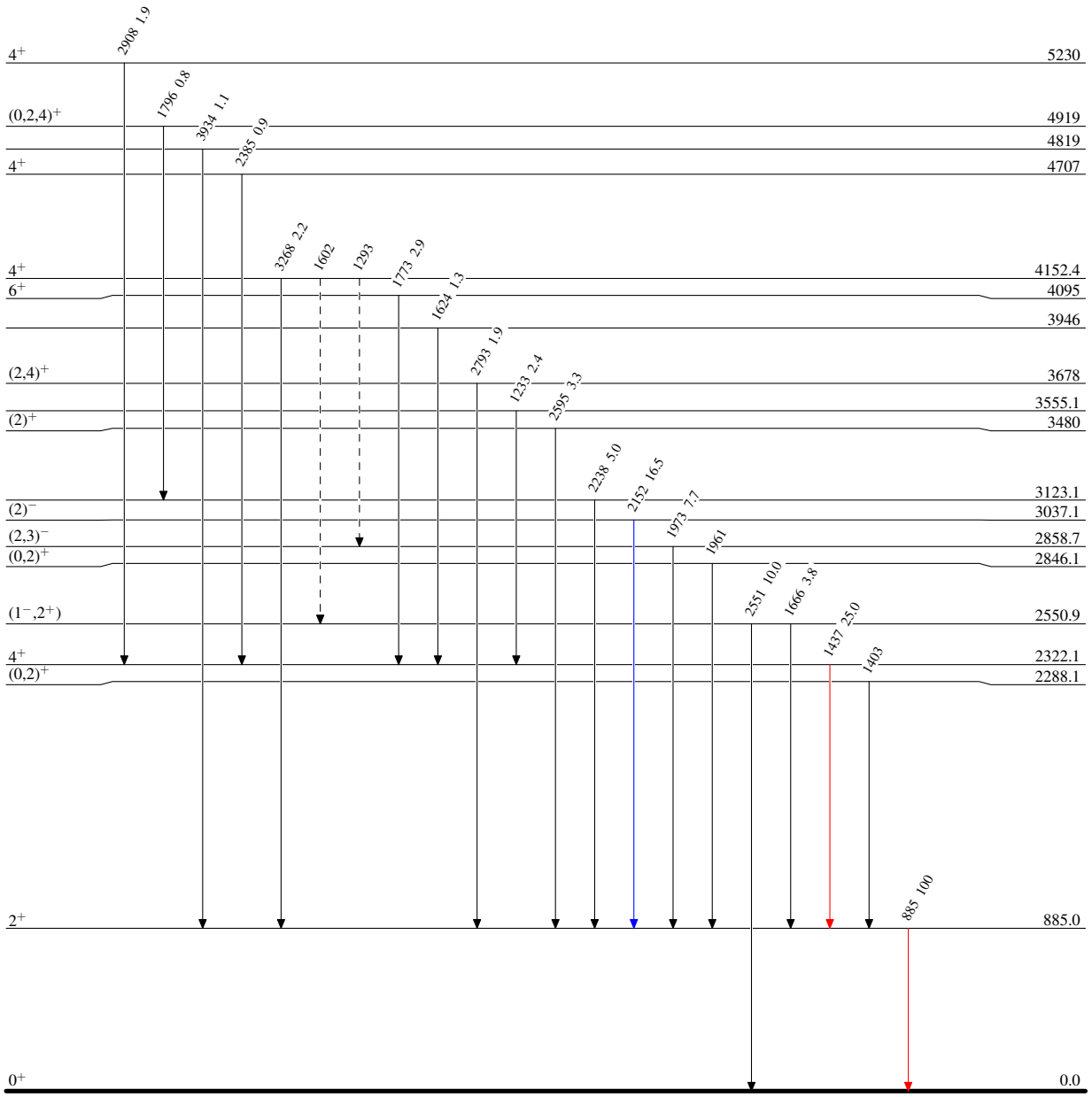
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

γ Decay (Uncertain)



$^{32}_{12}Mg_{20}$